Treatment/Treatability Issues

Wastewaters Requiring Treatment

If a facility chooses the P2 alternative, will they always have to install and operate a wastewater treatment system? What PFPR wastewater requires treatment prior to discharge?

The P2 alternative of the final PFPR rule stipulates that direct discharging facilities must treat *any* PFPR wastewater that remains following implementation of the P2 practices. Direct discharging facilities that are also pesticide manufacturers may be able to use their current treatment systems to treat PFPR wastewaters. Indirect discharging facilities must only treat, prior to discharge, certain PFPR wastewaters that remain after the facility has implemented the P2 practices. These wastewaters are all interior equipment cleaning rinsates (including drum rinsates), leak and spill cleanup water, and floor wash water (see Section IV of the preamble to the final rule in Appendix A of this guidance manual).

Does DOT test bath water require treatment prior to discharge if a can has burst in the bath?

If the bath is operated as a batch bath, the bath water may be discharged indirectly without treatment, even if a can has burst in the bath. Treatment is required prior to direct discharge.

If the bath is operated as a continuous overflow bath, the bath water must either have some recirculation under the P2 alternative (and may be indirectly discharged without treatment) or the facility must meet zero discharge for this source.

Many facilities have standard operating procedures in place for when cans burst in a DOT bath. At many facilities, these procedures include collecting the pesticide-containing wastewater for off-site disposal.

Treatment Technology Operations

Activated Carbon

What is the difference between the feed rate and the capacity of the carbon?

The feed rate is the rate at which wastewater enters the activated carbon adsorption unit. It is a unit of flow (i.e., volume per unit time), such as gallons per minute or liters per second. The feed rate should allow the wastewater sufficient time to contact the carbon so that contaminants can be adsorbed onto the carbon. If the feed rate is too high, pesticide active ingredients will pass through the carbon adsorption system that otherwise could have been adsorbed. During its treatability testing, EPA used a feed rate that gave the wastewater an empty bed residence time of approximately 15 minutes.

The capacity is the amount of pesticide active ingredient that will be adsorbed per amount of carbon. It is usually given in units of weight of pesticide active ingredient removed per weight of carbon, such as grams of pesticide active ingredient removed per gram of carbon. Determining the capacity can help one determine how much carbon is needed in the unit to remove a particular amount of chemical.

Does an activated carbon system have to be run continuously?

No, an activated carbon system may be run in batch mode. Facilities may store wastewater prior to treatment (storage of wastewater is common in this industry). EPA observed PFPR facilities treating wastewater with activated carbon in batch mode and also performed activated carbon treatment in batch mode on wastewaters collected from PFPR facilities. In addition, PFPR facilities with wastewater matrices that vary daily may find that batches of stored wastewater may be more consistent from treatment period to treatment period.

Since the PFPR rule does not require testing, how does one determine when to change carbon in an activated carbon system?

Although the rule does not require specific testing, it does require that a treatment system be *demonstrated* to be well operated and maintained. To demonstrate this, a facility may need to perform some testing to determine when carbon breakthrough occurs for their system and therefore when the carbon needs to be changed.

Can you use TOC to determine carbon breakthrough?

In some cases, TOC or other parameters may be used as an indicator of carbon breakthrough by a pesticide active ingredient, but only after treatability testing or monitoring has been conducted that demonstrates that TOC is a good indicator of breakthrough of that pesticide active ingredient. A parameter may be a good indicator of carbon breakthrough for a pesticide active ingredient if it tends to break through before or about the same time as the pesticide active ingredient, but not if it breaks through after the pesticide active ingredient.

When using activated carbon adsorption as a treatment technology, what does the facility do with the carbon once it is saturated? Must it be disposed of as a hazardous waste?

Spent activated carbon should be disposed of or regenerated. Manufacturers of activated carbon may take the carbon back for regeneration; however, the cost of regeneration typically depends on the amount of carbon to be regenerated, the distance to the regeneration facility, and other factors. Some facilities may wish to dispose of their spent activated carbon instead of having it regenerated. In this case, the activated carbon would need to be disposed of as hazardous waste if it meets the definition of hazardous waste in 40 CFR 261.4. Many pesticide active ingredients are not RCRA-listed hazardous wastes, and most PFPR wastewaters do not exhibit hazardous waste characteristics. Residue from treatment of PFPR wastewaters, such as spent activated carbon, would not be considered a hazardous waste if it did not contain a listed hazardous waste and/or did not exhibit a characteristic of a hazardous waste.

Emulsion Breaking

When performing emulsion breaking, won't the removal of the oil/scum layer remove organic pollutants?

Yes. The oil/scum layer removed during emulsion breaking typically contains some level of organic pollutants, and may also include organic pesticide active ingredients. During treatability tests conducted by EPA on wastewater collected from PFPR facilities, the emulsion breaking step typically lowered the pesticide active ingredient concentration in the remaining wastewater. However, it did not typically reduce the pesticide active ingredient concentration enough to be considered an adequate pesticide active ingredient treatment technology.

In general, pretreatment technologies are meant to be used in conjunction with the pesticide active ingredient destruction and removal technologies listed in Table 10, or other technologies demonstrated to be equivalent to those listed in Table 10. However, it is possible that some technologies that EPA has identified as pretreatment technologies can provide treatment equivalent to the technologies listed in Table 10. In many of the treatment systems sampled by EPA, removal of pesticide active ingredients was observed during pretreatment steps. For example, emulsion breaking typically occurs at conditions of low pH and temperature, which may also hydrolyze some pesticide active ingredients. An equivalency demonstration as described in Chapter 7 of the P2 Guidance Manual would be required for any pretreatment technology that a facility wished to use as the primary treatment technology for a pesticide active ingredient.

Does a facility have to use sulfuric acid or other concentrated acid to perform the emulsion breaking step?

No. It is not necessary to use a specific acid to perform emulsion breaking, as long as the selected acid lowers the pH to the desired level. In general, any strong acid (e.g., sulfuric, hydrochloric, or nitric acid) could be used. During EPA treatability studies on PFPR wastewater, sulfuric acid was used to lower the pH of wastewaters for emulsion breaking and neutralization after hydrolysis at high pH. However, facilities should be aware that the addition of acid to PFPR wastewater may generate toxic or hazardous components, so an acid should be chosen that will minimize the potential adverse health and safety risks and the generation of toxic and hazardous compounds. For chemicals that react to form hazardous or toxic byproducts under acidic conditions, regardless of the acid used, it may be advisable to use a different treatment technology that does not lower the pH of the wastewater, or to use P2 practices or off-site disposal instead of treating the wastewater.

Hydrolysis

What types of acid are used to perform acid hydrolysis?

There is no specific type of acid that must be used for any of the processes used to treat PFPR wastewaters, including acid hydrolysis. The only requirement is that the acid be capable of achieving the desired pH. In general, any strong acid, such as sulfuric, hydrochloric, or nitric acid, could be used. During EPA treatability studies on PFPR wastewaters, sulfuric acid was used to lower the pH of wastewaters for emulsion breaking and neutralization after hydrolysis at high (alkaline) pH. Facilities should also be aware that toxic or hazardous components may be generated through the addition of acid to PFPR wastewater, so an acid should be chosen that will minimize the potential adverse health and safety risks and the generation of toxic and hazardous compounds.

Precipitation

When performing hydrogen sulfide precipitation, what does EPA suggest to ensure that there is no excess hydrogen sulfide in the effluent from the system?

When performing chemical precipitation to remove metals or organo-metallic pesticide active ingredients, sodium hydroxide and/or sodium sulfide may be used to form these contaminants into a precipitate. EPA does not recommend adding hydrogen sulfide to remove pesticide active ingredients, and hydrogen sulfide should not form during sulfide precipitation as long as a pH of 7 or above is maintained in the system.

In general, the amount of sodium hydroxide and sodium sulfide added to wastewater to perform chemical precipitation should be based on the concentration of metals contained in the wastewater. However, facilities should conduct bench- or full-scale treatability tests to optimize the performance of their chemical precipitation treatment step. To determine whether excess sodium sulfide has been added during the chemical precipitation step, a facility should monitor the chemical precipitation effluent during the treatability testing and during full-scale treatment as it deems necessary. EPA based its cost estimates on an addition of 0.416 pounds of sodium sulfide per 1,000 gallons of wastewater treated for all facilities because it did not have information available on the specific concentrations of metallic and organo-metallic contaminants in PFPR wastewaters.

Treatment Residuals

How are the oil/sludge layers disposed of from treatment systems? Are they hazardous?

The oil/sludge layers from treatment systems may be disposed of in a variety of ways. They may be reused in the PFPR product, disposed of in an on-site treatment unit (such as an incinerator), or they may be disposed of off site. Off-site disposal may be done at a centralized waste treatment facility, waste-oil recovery facility, or other treatment and disposal facility. Oil, sludge, and other residuals from treatment are hazardous waste if they meet the definition of hazardous waste in 40 CFR 261.4.

Determination of Treatment Equivalency

If a wastewater requires treatment, does it have to be treated using the treatment technologies listed in Table 10?

No, facilities may use the appropriate Table 10 technology *or* an equivalent technology *or* a pesticide manufacturing treatment system that is treating the same pesticide active ingredients that are manufactured as are formulated/packaged/repackaged.

How does one identify an appropriate treatment technology for a pesticide active ingredient that is not listed in Table 10?

EPA tried to include all pesticide active ingredients identified at the time of promulgation of the regulation. As new pesticide active ingredients come into being, one could apply the technology transfer methodology (described in the treatability database reports, listed in Table 6-1 in Chapter 6 of this manual) that EPA used to develop Table 10. Also, as a starting point, one could identify the treatment technology(ies) listed in Table 10 for structurally similar pesticide active ingredients.

How does a facility justify using a technology other than those listed in Table 10?

The facility must demonstrate that the technology will be just as effective as the technology listed in Table 10 of the final rule for the pesticide active ingredient in question, or that the technology is used in a pesticide manufacturing treatment system used to treat the same pesticide active ingredient. Chapter 7 of the P2 Guidance Manual discusses the requirements for demonstrating that a technology will provide treatment performance equivalent to the technology listed in Table 10. In order to demonstrate equivalence, a facility must include treatability test results or sampling results (including those from literature, similar wastewater matrices, or self-monitoring) in their on-site compliance paperwork. A more detailed discussion of treatability tests is contained in Chapter 6 of the P2 Guidance Manual. The determination of equivalency will be based on a combination of the percent removal of pesticide active ingredient (in general, greater than 90% removal is required), final effluent concentration of the pesticide active ingredient, and the minimum detection limit for the pesticide active ingredient.

If treatability information is not available for a particular pollutant, it may be necessary to identify a treatment technology based on the facility's knowledge of the pollutant. For example, a technology that is effective on one pesticide active ingredient is often effective on other pesticide active ingredients with similar chemical properties and structure. Treatment effectiveness should, however, be verified through a treatability test. See Table 6-1 in Chapter 6 for sources of information on identifying treatment technologies and transferring treatability data from one pesticide active ingredient to another.

Are any pretreatment technologies alone effective enough to remove pesticide active ingredients and priority pollutants, or must they be used in combination with other technologies?

In general, pretreatment technologies are meant to be used in conjunction with the pesticide active ingredient destruction and removal technologies listed in Table 10, or other technologies demonstrated to be equivalent to those listed in Table 10. However, it is possible that some technologies that EPA has identified as pretreatment technologies can provide treatment equivalent to the technologies listed in Table 10. In many of the treatment systems sampled by EPA, removal of pesticide active ingredients was observed during pretreatment steps. For example, emulsion breaking typically occurs at conditions of low pH and high temperature, which may also hydrolyze some pesticide active ingredients. An equivalency demonstration such as the one described in Chapter 7 of the P2 Guidance Manual would be required for any pretreatment technology that a facility wished to use as the primary treatment technology for a pesticide active ingredient.

A facility that currently operates an activated carbon column generates wastewater containing 2,4-D, MCPP, and MCPA (all structurally similar chemicals). Table 10 lists chemical oxidation for 2,4-D and MCPA, but lists activated carbon for MCPP. Does the facility have to install both treatment technologies in an on-site treatment system?

Not necessarily. The PFPR rule allows technologies other than those listed in Table 10 to be used to treat wastewater containing a particular pesticide active ingredient, provided the facility can demonstrate that the technology is equivalent to the one listed in Table 10 (Chapter 7 of the P2 Guidance Manual discusses the requirements for demonstrating that a technology will provide treatment performance equivalent to the technology listed in Table 10). In this case, if the facility demonstrates that chemical oxidation is equivalent to activated carbon adsorption for MCPP, or that activated carbon adsorption is equivalent to chemical oxidation for 2,4-D and MCPA, only one of the technologies would need to be installed.

The technologies listed in Table 10 to 40 CFR Part 455 are those that are expected to effectively treat the PAI. When more than one technology can effectively treat a PAI, EPA listed the technology that is least expensive to employ. In the case of 2,4-D, EPA has data indicating that it is treatable by either chemical oxidation or activated carbon adsorption, but chemical oxidation is expected to be less expensive, therefore this technology is listed in Table 10. In the cases of MCPP and MCPA, EPA has data indicating that activated carbon adsorption is an effective treatment, but information on chemical oxidation is not available for these chemicals. Listed below are references gathered by EPA concerning the treatability of 2,4-D, MCPP, and MCPA. These documents can be found in the administrative record for the final PFPR rule using the document control numbers (DCNs) shown below.

Aly, O.M. et al., *Removal of 2,4-Dichlorophenoxyacetic Acid Derivatives from Natural Waters*, Rutgers University, Dept. of Environmental Science, New Brunswick, NJ, February 1965 (DCN F6303).

Research Triangle Institute, *Treatment Technology For Pesticide Manufacturing Effluents: Atrazine, Maneb, MSMA, and Oryzalin*, Research Triangle Park, NC, February 2, 1980 (DCN F5795).

Environmental Science and Engineering, Inc., *Final Report of Laboratory Study of Pesticides Wastewater Treatability*, November 11, 1985 and revised January 9, 1987 (DCN F6328).

Is an incinerator treating wastewater from pesticide manufacturing and PFPR operations that has an NPDES discharge permit for scrubber water considered a wastewater treatment unit (i.e., is the incinerator exempt from RCRA Part B permit requirements)?

No, the incinerator described above would not be exempt from RCRA Part B permit requirements for the following reason.

A unit that satisfies the definition of "wastewater treatment unit" set forth in 40 CFR 260.10 is exempt from Part 264 requirements for treatment, storage, and disposal facilities (TSDFs), Part 265 requirements for interim status TSDFs, and Part 270 requirements for RCRA permits. *See* 40 CFR 264.1(g)(6), 265.1(c)(10), and 270.1(c)(2)(v).

To satisfy the definition of "wastewater treatment unit" at 40 CFR 260.10, the unit must be a device that:

(1) Is part of a wastewater treatment facility that is subject to section 402 or 307(b) of the Clean Water Act;

(2) Receives and treats or stores an influent hazardous wastewater, or that generates and accumulates a hazardous wastewater treatment sludge, or treats or stores a hazardous wastewater treatment sludge; and

(3) Is a tank, as defined in § 260.10.

The incinerator described in the question would not satisfy the third criterion. Although the incinerator generally meets the broad definition of tank, it also meets the more specific definition of incinerator in § 260.10. EPA does not consider a unit to be a "tank" if another, more immediately relevant term would apply to that unit. Therefore, the incinerator would not be a wastewater treatment unit, and thus, would not be exempt from the requirements in Parts 264, 265, and 270. Instead, the incinerator would be subject to the Subpart O requirements for incinerators in Parts 264 and 265, permit requirements in Part 270, and any other relevant requirements.

Can EPA provide a reference in the pesticide manufacturing development document/final rule that demonstrates that incineration is equivalent and/or superior to treatment methods listed in the PFPR rule for various pesticide active ingredients?

Table 7-11 in the *Development Document for Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards for the Pesticide Chemicals Manufacturing Point Source Category* (EPA 821-R-93-016, September 1993) lists the BAT technologies used to establish numerical limitations for 120 pesticide active ingredients in that industry. These BAT technologies are considered to be equivalent to the technologies listed in Table 10 of the final PFPR rule.

Table 7-11 of the Pesticide Manufacturing Development Document lists incineration as the BAT technology for the following pesticide active ingredients: pendimethalin, acephate, phorate, terbufos, captafol, fenarimol, isopropalin, and tebuthiuron.

In addition, the preamble to the PFPR regulation (61 FR 57517) states that on-site incineration is equivalent to off-site incineration and is considered to meet zero discharge for the PFPR rule. See page 57527 of the preamble to the final rule located in Appendix A for more discussion regarding on-site incineration as a means to achieve zero discharge.

Treatability Testing

Did EPA evaluate inert materials in treatability tests?

EPA did not focus on the inert materials; however, in addition to analyzing wastewaters for the specific pesticide active ingredients, EPA analyzed for a full scan of organic and metal pollutants, including priority pollutants, to identify other potential pollutants of concern from inert ingredients. Treatment efficiencies were focused on pesticide active ingredients and priority pollutants.

Are the EPA treatability reports, including those reports listed at the end of Chapter 5, available on the Internet?

Not at this time, although all treatability reports generated during the development of this PFPR effluent guideline are available through EPA's Water Docket (see page 46 of Chapter 5 for information on contacting the EPA Water Docket). Please note that some treatability reports contain confidential business information and are available in a nonconfidential form.

Do treatability tests require elaborate QA/QC procedures?

No, the level of QA/QC conducted during EPA sampling and treatability testing is not necessary for facility treatability testing, but facilities should use a level of QA/QC that will ensure the quality of their data. Chapter 6 of the P2 Guidance Manual provides some direction on using QA/QC in treatability testing. The QA/QC procedures include preparation of a QA/QC plan and the collection of field duplicate, field blank, equipment blank, and trip blank samples.

What type of samples should a facility collect to test how the treatment system is operating (grab vs. composite)?

The type of samples collected to determine the efficiency of an operating treatment system depends on whether the unit operation is a batch or continuous operation. Generally, grab samples are collected for batch operations and composite samples are collected for continuous operations. Samples collected to characterize raw waste streams are typically grab samples because of the batch nature of wastewater generation. Samples collected during treatability testing are typically grab samples.

Do bench-scale test results scale up well to full scale?

The correlation between bench- and full-scale test results will depend on a variety of factors, including how well the bench-scale test was designed and performed, the difference in wastewater volume treated between bench- and full-scale treatment, the type of technology tested, the contaminants in the wastewater treated, and other factors. If a bench-scale test is well designed and performed, it should scale up well. However, the scale-up invariably results in some difference from bench-scale results due to the different equipment, operating conditions, and other parameters at the full scale. Although the bench-scale test can provide valuable information for the design and operation of a full-scale treatment system, it is commonly necessary to adjust the full-scale treatment system design and operating parameters to optimize performance. For scaling up from a bench-scale test to a large-volume full-scale treatment system, it may be advisable to perform a pilot-scale treatability test on an intermediate scale. Also, in some PFPR facilities, the volume of PFPR wastewater to be treated may only require equipment that typically would be considered pilot- or bench-scale.

An example that illustrates the difference in how different treatment technologies compare in terms of scale-up is discussed below. Hydrolysis bench-scale tests typically correlate well with full-scale treatment, provided an actual wastewater was treated, the full-scale unit is well-mixed, and other operating parameters such as temperature, pH, and treatment time are the same. However, activated carbon bench-scale tests may not scale up as well. Activated carbon bench-scale tests frequently use a beaker in which some activated carbon is allowed to come into equilibrium with a wastewater to determine the saturation loading. This is different from an actual treatment system in which wastewater passes through a bed of activated carbon, and therefore can result in differences between saturation loadings observed during bench- and full-scale operation.

What reference shows which pesticide active ingredients in Table 10 had treatment technologies established based on a transfer of treatability data?

This information is presented in the *Final Pesticide Formulators, Packagers, and Repackagers Treatability Database Report* and *Addendum* (see Chapter 5 for more detail on how to access these sources).

Sampling/Monitoring

Why is it necessary to evaluate the wastewater matrix, particularly as it pertains to inert ingredients that may be present in the wastewater?

Inert ingredients are covered in discharges from PFPR operations if they are also priority pollutants. However, the reason EPA suggests evaluating the wastewater matrix during the P2 audit is to identify possible contaminants in wastewater that may hinder effective treatment of pesticide active ingredients or priority pollutants. In these cases, the wastewater may require pretreatment in order to allow the treatment system to effectively remove the pesticide active ingredients.

How does one determine if the pesticide active ingredient is in the water phase or oil/sludge phase of a wastewater? Can one use alcohol-water coefficients?

Octanol-water coefficients can be used to determine whether a pesticide active ingredient is likely to be in the water phase or the oil phase of a wastewater. However, octanol-water coefficients are determined using a pure octanol-water system, whereas PFPR wastewaters typically contain a variety of contaminants that may render the octanol-water coefficient invalid for a particular wastewater. In addition, octanol-water coefficients are not available for many pesticide active ingredients. Therefore, the various phases of a wastewater may need to be chemically analyzed to determine what fraction of pesticide active ingredient has partitioned to each phase.

If a facility chooses to meet zero discharge through no discharge of process wastewater pollutants (rather than no flow), how do they show "zero"?

In order to demonstrate zero discharge analytically (instead of via "no flow"), any pesticide active ingredient potentially present in the wastewater must have an EPA-approved analytical method for use in wastewater, and the pesticide active ingredient must not be present at or above the detection limit in the approved method.

Some methods contain a detection limit, a method detection limit (MDL; 40 CFR 136, Appendix B), an estimated detection limit, or some other detection limit concept. The words "detection limit" are generally understood to encompass these terms.

Does a facility need to monitor for priority pollutants when conducting a treatability test to develop a relationship for surrogate parameters used to demonstrate a treatment system is well operated and maintained? If so, must they monitor for the whole list of priority pollutants, or only those pollutants that were identified in the BMR?

The PFPR rule does not require monitoring or the establishment of a surrogate parameter for compliance. However, if a facility chooses to use a surrogate parameter to demonstrate that a treatment system is well operated and maintained, they would monitor for specific pesticide active ingredients and the constituent chosen as the surrogate to establish the relationship between the surrogate and the PFPR process wastewater pollutants. In terms of priority pollutants monitoring, a facility could use a list of those priority pollutants identified in the BMR; however, if products/raw materials have changed since the BMR was developed, the facility should include any additional priority pollutants expected to be in the wastewater.

Are industrial users (IUs) required to submit monitoring data to the POTW/control authority if samples are collected in addition to samples required by the PFPR regulation?

Sample collection is not specifically by the PFPR regulation. However, the individual control mechanism with the POTW/control authority may require monitoring and analysis to demonstrate continued compliance; this is described in 40 CFR 403.12(g).

If a facility is using certain monitoring data to back up or demonstrate information in their initial or periodic certifications for the P2 alternative, then such data should be kept with the facility's on-site compliance paperwork and would be available to the POTW/control authority, as well as to enforcement officials.

EPA Test Methods

What if a wastewater matrix causes interference with the analytical method (and therefore, the detection limit is higher than normal)?

The discharger must eliminate the interference using the procedures given in EPA's *Guidance on Evaluation, Resolution, and Documentation of Analytical Problems Associated with Compliance Monitoring* (EPA 821-B-93-001) or other interference elimination procedures.

Are the EPA-approved methods highly specific methods?

Many of the EPA-approved methods are based on methods developed by pesticide active ingredient manufacturers. In general, these methods are expensive to run and not performed by many laboratories. However, there are several methods that will detect a series of different pesticide active ingredients. For example, Method 1656 is used to analyze organo-halide pesticides. For more information on pesticide active ingredient methods, please reference *Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater* (EPA 821-R-93-010).

EPA has also produced other reference materials on water and wastewater methods, including the Environmental Monitoring Methods Index (a powerful PC database that electronically links over 4,000 substances with methods and regulations) and the *Methods and Guidance for the Analysis of* Water (EPA 821/C-97-001). These reference materials are available through the National Technical Information Service (NTIS), which can be reached between 8:30 a.m. and 5:00 p.m. Eastern Time at (703) 487-4639 or via the Internet at **http://www.ntis.gov/ordernow**.

Does EPA have method detection limits for each pesticide active ingredient that has an EPA-approved analytical method?

Yes, although facilities must also take into account the wastewater matrix and the number of dilutions performed by the laboratory.

Is it possible to use a non-EPA-approved method for pesticide active ingredients that do not have approved methods promulgated (i.e., use a facility's method)?

Yes. For pesticide active ingredients that have no EPA-approved analytical methods, PFPR facilities may use alternative sampling and analytical methods as specified in 40 CFR 136.4 and 403(g)(4). See page 57548 in the preamble to the final rule in Appendix A for more detail.

Are the methods promulgated under Part 455 for pesticide active ingredients valid for the NPDES program and pretreatment programs under Part 136?

Yes. Language in 40 CFR 403 and 136 allows for analytical methods found in Part 136, Section 304(h) of the Clean Water Act, *or* that are approved by the Administrator (403.12(g)(4) and 136.4, 136.5). Therefore, although the Part 455 regulations have not been incorporated into Part 136, the Administrator has approved these analytical methods by signing the Pesticide Manufacturing Effluent Limitations Guidelines and Standards (58 FR 50637; September 28,1993). These pesticide active ingredient methods have been published in a document entitled, "*Methods for the Determination of Nonconventional Pesticides in*

Municipal and Industrial Wastewater, EPA-821-R-93-010-A, Revision 1, August 1993."

Are the methods part of the AWWT (American Waste Water Treaters) published methods?

The EPA-approved pesticide active ingredient methods have been published in the FR (40 CFR 455.5, Subpart D), and are available from EPA (*Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater*, EPA-821-R-93-010-A, Revision 1, August 1993).

How does a facility adjust to changing method detection limits (MDLs) for pesticide active ingredients if the "zero discharge" option (with flow) is the compliance option of choice? Would a capping of MDLs be allowed?

No. Facilities using MDLs to demonstrate compliance with zero discharge are allowed to do so because MDLs are the closest to zero that can be currently measured. The MDLs are *not* the set limitation. If improvements in analytical instruments leads to the lowering of MDLs, those facilities demonstrating zero using MDLs would need to show compliance with the lower MDLs.

Determination of Sufficient Treatment

What does EPA consider "effectively treated" for this rule (i.e., is it a certain percent removal)?

A facility can evaluate the effectiveness of a treatment technology by performance measures that look at how much contaminant is removed from the wastewater, the amount of other waste generated by the treatment step, and the cost of the treatment. The facility should evaluate three measures to determine if the treatment technology effectively removed the contaminant: percent removal, final effluent concentration, and minimum detection limit. For example, if 95% or more of a constituent is removed by a technology, that technology would be considered effective. Conversely, if a technology only removes 30% of a constituent, but the constituent is removed to below its detection limit, EPA considers the constituent to be effectively treated. The facility should also take cost into account. A technology may effectively remove a constituent, but at a high cost relative to other treatment technologies that may also effectively remove the constituent. Chapter 6 of the P2 Guidance Manual provides more detail on how to measure treatment effectiveness.

If a facility generates high concentrations of pesticide active ingredients in rinsewaters, is the goal to treat the wastewater to nondetect levels of pesticide active ingredients? If not, what criteria determine whether a wastewater is effectively treated?

Nondetect levels are a good goal, but are not required by the P2 alternative. The goal of the P2 alternative is to use the pollution prevention, recycle, and reuse practices in the rule (in combination with treatment when necessary) to achieve a reduction of pollutants, while preventing possible cross-media impacts associated with zero discharge. Following the implementation of the P2 practices, evaluation of the percent removal or destruction of the pesticide active ingredient, as well as the final effluent concentration and detection limit, determines whether a wastewater has been effectively treated. In most cases, these technologies can reduce the concentration of the pesticide active ingredient to at or near detection limits. A treatment goal may be set by the control/permitting authority using best professional judgement.

Will most PFPR facilities be able to run a treatment system as envisioned by EPA, in terms of size and cost?

Yes. Most PFPR facilities do not generate large volumes of water, and will be able to store their wastewater over time and treat the water in 3 to 4 batches per year. In many cases, facilities will be able to implement P2 practices instead of treating their wastewater. Some facilities may also choose to contract haul small volumes of wastewater for off-site disposal.

The treatment systems effective on PFPR wastewaters generally use simple, easily operated unit operations that use standard, off-the-shelf equipment, particularly at the small scale needed by the typical PFPR facility. The treatment system can be designed to be operated in a batch mode, so facilities generating a small volume of wastewater can store it until a sufficient volume is available for treatment. During the rulemaking process, EPA designed a small-scale wastewater treatment system that was then used to treat wastewaters collected from PFPR facilities in batches of about 100 gallons. This system used standard, off-the-shelf equipment. EPA also evaluated the cost of compliance with the P2 alternative and found that the P2 alternative (with listed modifications and appropriate treatment) is economically achievable for the industry.

Is EPA concerned about reaction byproducts that may be generated during wastewater treatment operations? Sometimes these byproducts have a negative impact on the environment, but are not analyzed or treated.

Yes, EPA is concerned about reaction byproducts; however, for this rule, EPA focused on those reaction byproducts that are pesticide active ingredients or priority pollutants. In general, reaction byproducts have lower toxicity factors than the pesticide active ingredients themselves.

The control/permitting authority should evaluate the possible impacts on local limitations from specific chemical byproducts that may form during treatment operations. The presence of these byproducts may require additional treatment, or may require a different primary treatment technology to be used in specific instances.

In one treatabilty study conducted by EPA, chlorinated and other organic compounds were generated from chemical oxidation of PAIs using a chlorine-based oxidizer. Chemical oxidation produced: chloroform, bromodichloromethane, dibromochloromethane, and acetone in wastewater containing Metam; 1,3,5-trithiane in wastewater containing KN-Methyl; and N,N-dimethylformamide in wastewater containing Namet. Polychlorinated dioxins were also detected in parts per quadrillion concentrations in these wastewaters after treatment. Where chemical oxidation with a chlorinating agent results in the generation of chlorinated organics, use of a non-chlorinating oxidizer, such as ozone or peroxide may provide effective treatment without generating chlorinated organics.

Why is "pollution prevention" listed as an appropriate *treatment* technology?

Based on available data, EPA was unable to identify a cost-effective technology for use in the PFPR industry for some pesticide active ingredients on Table 10. Therefore, EPA determined that, if a facility generates wastewater that *only* contains such pesticide active ingredients, they are in compliance with the rule if they have implemented the Table 8 pollution prevention practices (i.e., such facilities do not have to treat PFPR wastewaters containing these specific PAIs prior to discharge).

Are all the different technologies listed in Table 10 part of a pretreatment system that a facility should have in place to treat wastewater prior to discharge to a POTW?

The technologies required for an on-site treatment system are identified based on the pesticide active ingredients present in the wastewater discharged from the facility. These technologies could be combined into one treatment train, or could be conducted individually on separate wastewaters, depending on how the facility chooses to treat their wastewater. In addition, if emulsions exist, an emulsion breaking step (or equivalent technology) is required to meet the definition of "appropriate" treatment.

Why isn't neutralization considered treatment?

For this rule, treatment is intended to mean removal or destruction of pesticide active ingredients or priority pollutants. Neutralization does not achieve that purpose.

Is there any guidance on how much money facilities should spend on treatment of PFPR wastewater?

There is no real guidance on the amount of money a facility should spend on wastewater treatment; it depends on a number of factors and the facility should consider all of these factors in making a final compliance decision. These factors include the amount of wastewater being generated, treatment currently in place at the facility, the size of the facility, and the how economically sound the facility is. A facility should consider whether treatment is the most cost-effective solution for their particular situation. A facility may be able to treat their wastewater adequately using available technologies; however, if the amount of wastewater that would need to be treated is very small, the facility may find it more cost-effective to contract haul it instead of installing or adding additional treatment technologies.

EPA performed an economic assessment for this rulemaking to determine the most cost-effective regulation for the PFPR industry. As part of this assessment, EPA estimated the cost to comply with the regulation. Subcategory C facilities were estimated to incur an average annual cost of $39,900 for stand-alone PFPR facilities and $373,000 for PFPR/manufacturing facilities; refilling establishments (Subcategory E facilities) would incur compliance costs of $1,000 or less. The estimated total annual cost to the industry is $29.9 million.

Why calculate the destruction and removal efficiency (DRE) for a constituent that is below the detection limit in the effluent?

The PFPR regulation does not require facilities to calculate the DRE of pesticide active ingredients or priority pollutants; however, it may be helpful to determine which treatment units in a treatment train are providing significant removal of the constituents of interest. For example, the following table summarizes the removal of a constituent through a treatment system consisting of hydrolysis and activated carbon. The DRE shows that even though activated carbon removes the constituent to below detection (i.e.,µg/L), the hydrolysis unit achieves the majority of the constituent's reduction (i.e., 98 percent).

Wastewater Source	Concentration (µg/L)	DRE
Raw wastewater	1,000 µg/L	—
Hydrolysis effluent	20 µg/L	98%
Activated carbon effluent	<10 µg/L	>50%

In addition, calculating the DRE can help faciliites demonstrate equivlency of an alternate technology and/or demonstrate that the treatment system is "well operated and maintained."

Can EPA clarify what is meant by "organics" in Table 6-2, Wastewater Characteristics That Adversely Impact Treatment Effectiveness, of the P2 Guidance Manual (i.e., are there specific organic chemicals that interfere with activated carbon adsorption)?

"Organics" refers to any organic chemical contained in the wastewater being treated. Due to the variable nature of PFPR formulations and operations, the specific organic chemicals contained in PFPR wastewaters and their concentrations vary from facility to facility. Therefore, Table 6-2 does not identify specific organic chemicals, but indicates where the presence of organic chemicals may cause a technology to perform poorly. In the case of activated carbon adsorption, organic chemicals will compete with the pesticide active ingredient for available adsorption sites on the carbon, reducing the total amount of pesticide active ingredient that will be adsorbed by a given amount of activated carbon, and resulting in more frequent carbon changeouts. The degree to which organic chemicals will affect the performance of activated carbon adsorption will depend on the specific organic chemicals in the wastewater, the concentrations of those chemicals, and the pesticide active ingredients targeted for removal by activated carbon adsorption. In some cases, the presence of organics may not significantly affect the performance of activated carbon, while in others it may render it ineffective. Table 6-3 lists some pretreatment technologies that may be useful in removing organics prior to treatment by activated carbon adsorption.

Who makes the decision on how much treatment is needed?

The control/permitting authority must use BPJ to determine if the facility has installed the appropriate treatment and if the treatment system is well operated and maintained.

What happens if a facility needs to add different technologies to their treatment system in the future?

If a facility plans to add new production to their PFPR operations, they must incorporate the appropriate P2 practices into their operations and identify the appropriate or equivalent treatment technology(ies) to be put in place if the new production generates wastewater to be discharged. The P2 practices and treatment technologies must be certified (e.g., at the time of submittal of the periodic certification) and approved by the control/permitting authority before the facility can begin to discharge wastewater associated with the new production.

If a facility operates a treatment system consisting of hydrolysis and activated carbon, and decides to drop hydrolysis and only run activated carbon, would the facility require approval first?

If the Table 10 technologies for the pesticide active ingredients present in the wastewater are both hydrolysis and activated carbon, then the facility would need to show that activated carbon is *equivalent* to hydrolysis for those pesticide active ingredients whose listed technology is hydrolysis before removing the hydrolysis unit from the treatment system. In addition, the facility must also demonstrate that the activated carbon system would be well operated and maintained. This would include reevaluating the frequency of carbon changeout to account for the carbon removing more pesticide active ingredients (and therefore becoming saturated more quickly).

Well Operated Treatment Systems

If a facility adds a new product (e.g., diazinon), which has a Table 10 technology of hydrolysis, can the facility use different surrogates (e.g., half-life, treatment time, pH, temperature) for that one pesticide active ingredient than are being used for the rest of the system (e.g., TOC and carbon change-out for activated carbon units)?

Yes. However, a surrogate parameter that is approved for a facility's treatment system will depend on the treatability data used to support the use of the surrogate and the ability to show a relationship in the data between the pesticide active ingredient and the surrogate.

Compliance

Baseline Monitoring Report

Is guidance available for completion of the baseline monitoring report (BMR)?

See Appendix E for EPA's guidance memorandum on completing the BMR. The BMR was due on July 7, 1997 for existing indirect dischargers.

To whom is the BMR submitted and where is this stated?

The BMR is submitted to the control authority. For states that have approved pretreatment programs, the BMR goes to the POTW/control authority. In other states, the BMR may be submitted to the regional EPA office. Section 403 of Title 40 of the